INSTRUCTION MANUAL

GASTECHTOR

CARBON DIOXIDE/OXYGEN INDICATOR

MODEL 3252OX

SERIALS: L025 /

CO_2 DETECTION RANGE: 0-25% CO_2

OXYGEN DETECTION RANGE: 0-25% O_2

ALARM SETTINGS:

CO_2: 1.0% CO_2 (Rising)
O_2: 19.5% O_2 (Falling)
O_2: 25% O_2 (Rising)

CONTENTS

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WARNING

Carbon dioxide is a colorless, odorless and tasteless gas that can produce a debilitating effect on humans, including impaired breathing. This gas is heavier than air and it seeks the lowest levels, displacing normal air. Where carbon dioxide is known to exist in locations such as manholes, tanks and tunnels, a test for excess carbon dioxide or sufficient oxygen content should be made before personnel enter the area. Entry into an oxygen (air) depleted space can cause immediate unconsciousness, followed soon by death by suffocation if resuscitation is not carried out promptly after loss of consciousness.

SUPPLEMENTARY INSTRUCTIONS

MODEL 3252 OX

CO_2 RANGE

This instrument is a standard Model 3252OX with the following modification:

A. Range

1. This instrument is calibrated on 0-25% Carbon dioxide. Read all references to the standard 0-5% CO_2 range as 0-25% CO_2.

2. The alarm point is set at 1% CO_2, instead of the standard 0.5% CO_2.

3. The meter dial is graduated over the range 0-25% CO_2.

B. PARTS List

81-0315 Calibration kit (w/cylinders of 2.5% CO_2 in air)

In all other respects, this instrument is as described in the following Model 3252OX Instruction Manual.

INSTRUCTION MANUAL

GasTechtor Portable Carbon Dioxide/Oxygen Indicator

Model 32520X

I. INTRODUCTION

The Model 32520X GasTechtor is a portable gas detection instrument designed to determine carbon dioxide and oxygen content of the air around various industrial processes. It reads carbon dioxide over the range 0-5% CO_2, actuating a characteristic alarm whenever reading exceeds a preset level, and oxygen over the range of 0-25% O_2, actuating an alarm when O_2 reading falls below a preset level.

Instrument is ruggedly constructed to withstand rough handling in industrial environments.

Samples of the atmosphere under test are drawn through a hose by means of a built-in pump and analyzed for CO_2 in a simplified NDIR (Non-Dispersive Infrared) cell and then for oxygen in an electrochemical cell. Solid-state amplifiers are used to amplify indications of the elements to give adequate voltage to drive the meter and the alarm circuits.

Power for the instrument is provided by a built-in rechargeable battery pack. An extension hose and probe permits withdrawal of sample from the space under test. The audible alarm sounds whenever CO_2 concentration exceeds, or O_2 concentration falls below, preset levels. An audible signal is also given in case of malfunction or a dead battery.

II. DESCRIPTION, DETAILED

A. Housing

The Model 32520X is housed in a fiberglass case which is durable, shock-resistant and protected against entry of water. The lower half, containing the batteries, oxygen sample chamber and sampling system, has no openings near the bottom and hence can safely be placed in mud or water up to 3 cm depth without hazard to the internal components.

The upper half contains all of the electronic circuitry plus the infrared cell for CO_2 detection, and is provided with a substantial carrying handle. The lip of the upper case overlaps the lower to shed water. Upper half is clamped to lower by means of a heavy-duty knurled thumbscrew.

B. Carbon Dioxide Sensor

Gas detection by the infrared method is based on the principle that every gas absorbs infrared energy of a characteristic frequency. In this instrument a broad-band infrared source (a heated filament) emits energy which is filtered to produce a narrow range of frequencies characteristic of CO_2, and passed through an enclosed chamber containing the gas sample to be analyzed. Any carbon dioxide in the sample selectively absorbs energy of that frequency, resulting in reduced infrared energy reaching the solid state sensor. This change in energy can be detected, amplified and used as an indication of CO_2 concentration, displayed on a meter and arranged to sound a alarm at a preset level.

Calibration and alarm settings are adjustable, using the potentiometers marked SPAN and ALARM respectively. Span can be set while a known gas sample is admitted to instrument. Alarm can be set as described in Section IV.B., calibration and adjustment.

C Oxygen Sensor

The oxygen sensor is an electrochemical cell in which gold and lead electrodes are immersed in an alkaline electrolyte, and covered by a permeable fluorocarbon membrane. Oxygen from the surrounding atmosphere diffuses through the membrane and enters into an electrochemical reaction whose rate is directly proportional to the partial pressure of oxygen, the end product of this reaction being lead oxide. The current generated by this reaction is amplified and used to drive the meter and the alarm circuit. The detector is clamped into a cavity in an anodized aluminum block, through which the sample flows after it leaves the pump. Oxygen cell connects to circuit board by a 7-pin plug connector.

D. Meter

Indications of the instrument are displayed on a meter, visible through a window on top face of instrument case. Meter has two sets of graduations and reads carbon dioxide or oxygen concentration directly, depending on whether range switch is in the CO_2 or O_2 position. A mark on scale, "BATT CK", represents the minimum permissible battery voltage, as an indication of state of charge of the battery.

Controls and Indicators

The six controls that are used in normal operation of the instrument are arranged on the left side of instrument as viewed from the rear. These controls are recessed to minimize possibility of accidental operation.

1. POWER switch, an alternate-action pushbutton switch which energizes circuit when pressed. An orange indicator dot is exposed when the switch is in the ON position, serving as a mechanical pilot light.

2. BATT. CK. switch, a momentary push button switch, when pressed connects meter as a voltmeter for battery condition check. Instrument must be in CO_2 range for battery check switch to function.

3. Range, an alternate-action push button switch which selects the range displayed on the meter, either carbon dioxide in the "OUT" position or oxygen in the "IN" position. A colored indicator dot shows when the switch is "IN".

4. CO_2 ZERO, a slotted-shaft potentiometer which is used to adjust circuit to read zero in the absence of carbon dioxide.

5. OXY CAL, a slotted-shaft potentiometer which is used to adjust circuit to display 21% on the meter when detector is surrounded by known normal air.

6. ALARM switch, which when pushed in will silence the audible tone. It is an alternate-action push button switch similar to the POWER switch. When in the IN (alarm off) position an orange indicator dot shows.

7 Alarm lights, red (CO_2) and amber (O_2), illuminate when the corresponding channel is in alarm condition. Alarm lights operate regardless of the position of the Range and Alarm Switches.

F. Buzzer

A solid-state electronic buzzer is mounted at the rear of instrument, behind perforations which permit transmission of sound. The buzzer gives a characteristic pulsed tone on alarm in either range (rising CO_2, falling O_2) with O_2 alarm giving an alternating long-short pulse signal and CO_2 giving a series of long pulses. A continuous tone sounds in case of malfunction, either low battery voltage or downscale drift of meter, in case of high oxygen reading or when both ranges indicate an alarm condition simultaneously.

G. Batteries

The battery pack, consisting of seven 3.5 ampere-hour nickel-cadmium cells in series, is secured within lower half of case. The cells are sealed as a unit, either with threaded bushings in bottom for clamping to instrument case, or with holes all the way through to accommodate 3"-long screws and a hold-down bar. Power output (red, orange and

black) leads extend from front end of pack, and terminate in a plastic plug connector which mates with a connector on the main circuit board. A similar connector at rear connects to the charger socket, so that battery may be unplugged at both ends for convenient removal. Current limiting resistors sealed into the pack limit maximum current that can be drawn on short circuit. Battery pack will power the instrument for approximately 6 hours. A protective fuse (type 3AG 1 amp) is installed in a recessed fuseholder set into top surface of pack, and serves as an added protection against short circuit or overload.

GasTechtor instruments may be supplied with the 49-8051 Battery Pack with replaceable cells. This design was developed for the convenience of replacing any cell that may fail, in lieu of having to replace an entire battery pack. This battery pack is permanently secured by two screws through the bottom of the case.

An optional pack (49-8052) designed specifically for disposable batteries is also available. This battery pack will take alkaline or carbon flashlight type cells. This pack does not have a charger connection.

H. Circuit Boards

All circuit components are arranged on two epoxy-glass printed circuit boards, the main CO_2 board and the smaller O_2 board located above it. The CO_2 board includes the power supply, the gas detection amplifier and alarm circuits and associated controls for CO detection. The O_2 board includes similar components for O_2 detection, except it uses power from the CO_2 board.

Six adjustment potentiometers, three for CO_2 on the CO_2 board and three for O_2 on the O_2 board, are provided on underside of circuit boards, available for user adjustment when case is opened. Oxygen potentiometers are circular in shape and clustered together in line near the rear of the O_2 board. Potentiometers for the CO_2 circuitry are square and are spread across the CO_2 board.

1. The CO_2 potentiometers are:

    a. SPAN, near center of board, to set sensitivity of CO_2 circuit to required value to produce a correct reading on a known calibrating sample.

    b. ALARM Threshold, at the front end of board, to set the gas concentration at which the CO_2 alarm is actuated.

    c. Coarse ZERO, at the rear end of board, to extend the range of the external ZERO for CO_2.

2. The oxygen potentiometers are:

   a. OXY ZERO, to balance the oxygen circuit for Zero output when the detector is surrounded by oxygen-free gas such as nitrogen. Potentiometer is forwardmost of the three.

   b. DWN ALM Threshold, to set the oxygen concentration at which the low oxygen alarm is actuated. This alarm is actuated by falling O_2 concentration. It is the center of the three potentiometers.

   c. UP ALM Threshold, to set the oxygen concentration at which the high oxygen alarm is actuated. This alarm is initially set at 25% O_2 concentration. Potentiometer is located at the rear corner of the board.

I. Charger

A separate battery charger is provided, which plugs into socket in rear of case. This charger is the No. 49-2133 (49-2134 for 220-240V AC) dual-rate timed charger, which provides a full charge over a 16 hour period, then automatically cuts back to a sustaining rate. An amber light shows that battery is receiving a charge; when complete, the green light indicates that the battery is ready to use.

J. Sample system

Sample system consists of the flow path, from probe to sample inlet to pump to oxygen chamber to CO_2 reaction chamber. These components are further described below.

1 Probe, a 28" long, 1/4" OD stainless steel tube with transparent-bodied filter housing in handle. The cotton-ball filter element is readily replaced by unscrewing the filter housing from the threaded base. Filter should be inspected frequently and replaced when it becomes discolored. Probe is cross-drilled 4" from the end, to prevent water from being drawn into the instrument.

2. Hose, a 5' polyethylene lined tube with threaded connectors at each end, to mate with the probe and the inlet fitting on instrument.

3. Inlet fitting, a threaded male coupling on front of instrument.

4 Filter, a transparent-bodied disposable assembly with 1/4" nipples on inlet and outlet. Filter removes dust and liquid water from incoming sample, thus preventing interfering particles from entering the sensors. It is installed inside instrument housing.

5. Pump is of the motor driven diaphragm type, with a brushless DC motor having no commutator or sparking contacts. It operates from an internal voltage regulator whenever power switch is on.

6. Infrared cell, a tubular chamber with inlet and outlet fittings to allow the filtered sample to pass through it. Windows at each end allow infrared energy to pass through while at the same time keeping the sample confined within the cell. The sample flow discharges from the CO_2 cell to the oxygen chamber.

7. Oxygen chamber is an anodized aluminum block having inlet and outlet fittings and containing a diffusion cavity into which the oxygen cell is clamped. Cell is held in place by a metal retaining strap and sealed with an O-ring. The flow discharges through an opening at front of instrument after it has passed through cell.

K Continuous Operation

Instrument can be operated continuously from a 12 volt DC source, such as a 12 volt vehicle battery, by use of a Continuous Operation Adapter. This is a power cord with plug to fit charger socket. When connected to instrument and to a 12 volt source, it will carry the load and tend to recharge the battery. It may also be used as a DC charger.

Adapter is normally supplied with a cigarette lighter plug, which is polarized correctly for a grounded-negative vehicle. Order Part No. 47-1501. If a separate battery is to be used, order an adapter with plus and minus spring clips, and be sure to observe polarity. An adapter for operation from 115V AC is also available. Order Part No. 49-2037.

III. OPERATION

A. Normal Operation

To use instrument, carry out the following steps:

1. Connect probe and hose to fitting on front of instrument.

2. Press POWER switch to turn instrument on, with orange indicator dot showing. Meter will initially deflect upscale and pulsing alarm signal will sound. Audible hum of pump will be noticed.

3. With range select switch in CO_2 (OUT) position, press BATT CK button and note meter reading. If reading is below BATT CHECK mark on meter, turn off instrument and recharge batteries.

4. Allow to warm up in CO_2 range until meter stabilizes (about a minute). With probe inlet in a normal air location, turn CO_2 ZERO shaft to bring meter to halfway between 0 and the first increment on the CO_2 scale (approximately 0.05%).

5. Next, put range switch in OXY (IN) position. Verify that probe is in a normal-air location; then turn OXY CAL control to bring meter to 21% (CAL) indication.

6. Verify normal operations by breathing out through your mouth and letting the probe sample your expired breath.

   Oxygen reading should move downscale and activate the alarm at 19.5%. In CO_2 range, reading should come up to about 2.5%. Both alarm lights and a steady audible alarm tone should come on during this test.

7. To take a reading, select meter range with range switch either CO_2 or O_2. Place tip of probe at point to be tested, and watch meter. Any CO_2 or O_2 abnormality present will indicate on the scale, when in appropriate range. If reading exceeds CO_2 alarm setting (see cover) pulsed red light and audible alarm will commence and will continue until source of CO_2 is removed. If reading falls below oxygen alarm setting (normally 19.5%) pulsed amber light and audible alarm will commence, and will continue until normal oxygen content is restored.

   An atmosphere containing more than the normal 21% oxygen will produce an increased oxygen reading. A steady tone will sound when reading reaches or exceeds 25% O_2. Light does not accompany this high oxygen alarm.

8. Monitoring for carbon dioxide and for oxygen is continuous and simultaneous, independent of range switch position. If either condition goes off-normal, corresponding alarm light and audible signal will sound. If both abnormal gas conditions exist simultaneously, both lights will blink in their normal pattern but the buzzer will sound continuously.

B. Abnormal Indications

1. If battery voltage drops below the designed value (about 8 volts), the low battery alarm will sound. This is a continuous audible tone. To verify the cause of the alarm, press BATT CK switch and note that the meter reads below check mark. Instrument will operate for about 20 minutes after it goes into low battery alarm.

2. If CO_2 zero drifts or moves below 0 by 5% or more, the low limit alarm will sound. This is also a continuous tone, and the cause can be recognized by a glance at the meter. The following are possible causes for downscale meter movement:

   a. Incorrect zero adjustment

   b. Defect in infrared analysis cell.

3. Note that the instrument is equipped with a "live zero" in which the OFF or rest position of meter is about 5% of scale below the zero position. Thus a glance at the meter will show that the instrument is active. CO_2 Zero drift as far down as the OFF mark will actuate the malfunction alarm.

4. If oxygen cell output declines or deteriorates, as is likely toward the end of cell life, this will produce a reduced reading, and a low oxygen alarm.

5. If oxygen detector is unplugged, or if one of the wires connecting it internally is broken, reading will go to zero, and low oxygen alarm will sound.

6. The steady audible tone sounds when the oxygen reading exceeds 25%. This characteristic is provided to warn against the increased fire hazard due to excess oxygen. It also serves as a warning in case of oxygen cell failure in the high-output mode, which can occur occasionally. It further precludes accidental or intentional incorrect adjustment of the oxygen calibrate control to an abnormally high level above 25%.

IV. CALIBRATION AND ADJUSTMENT

A. Carbon Dioxide Calibration

The following steps should be carried out with the range switch in CO_2 OUT position.

To check and adjust calibration on a known gas sample:

1. Turn instrument on and allow it to warm up and stabilize, preferably for at least 5 minutes. Be sure batteries are charged sufficiently to read above the check mark, then adjust zero to give a reading of 0.05% (halfway between 0 and first mark on the upper scale) if setting is fresh air, or to 0.0 if detector is exposed to a known CO_2-free sample.

2. Open instrument case by loosening captive knurled screw at front. Lift upper half of case slightly, move 1/4" to rear to disengage rear clamp; then separate the two halves. Locate CO_2 SPAN potentiometer on underside of circuit board near middle.

3. Connect instrument inlet to a known calibrating gas sample. If the sample exists within a large container at atmospheric pressure, the hose inlet may be inserted into the container. Watch meter carefully, and when it reaches its maximum reading, adjust to match known CO_2 concentration of sample. To adjust, turn SPAN potentiometer using a small screwdriver. Clockwise rotation increases reading. This is a single-turn potentiometer.

4. If GasTech Calibration kit is to be used to introduce gas into the instrument, proceed as above but:

   a. Screw dispensing valve onto the calibrating gas cylinder and attach it to one branch of the plastic "Y" connector on the gas collecting bag. Attach the probe of the instrument to the other branch of the "Y" connector. Make attachments with the flexible plastic tubing provided in the kit.

   b. While instrument is operating, open dispensing valve until collecting bag remains partly distended.

   c. Make the SPAN adjustment as in Step 3 above.

5. If calibration cannot be completed successfully, replace infrared detector, (see MAINTENANCE, Section V.)

B. Carbon Dioxide Alarm Threshold

The reading at which the alarm is actuated can be set by use of the ALARM Threshold potentiometer. To set:

1. Turn ZERO to bring meter to desired alarm setting.

2. Turn ALARM Threshold potentiometer to the point where alarm just operates. Clockwise rotation will raise alarm setting. Verify setting by turning ZERO to bring meter into and out of alarm zone.

C. Oxygen Zero Adjustment

The following steps should be carried out with range switch in OXY IN position, to check and adjust zero on a known oxygen-free sample.

1. While instrument is still open, identify oxygen ZERO potentiometer, which is the forward-most of the three located at the rear of the oxygen circuit board.

2. Admit a known oxygen-free sample, such as nitrogen, argon or helium, to sample inlet.

3. Watch meter carefully. If reading does not go exactly to zero, adjust it by turning ZERO potentiometer. Counterclockwise rotation will decrease reading.

4. If zero adjust cannot be made, replace oxygen cell.

5. After zero adjustment has been completed, return probe inlet to normal atmospheric air. Readjust OXY CAL control as necessary to bring meter reading to 21%.

6. If reading cannot be set high enough, replace oxygen cell.

D. Oxygen Alarm Threshold

The readings at which the alarms are actuated can be set by use of the alarm threshold potentiometers. To set:

1. Turn OXY CAL control to bring meter needle down to desired alarm setting, for example 19.5%.

2. Locate DWN ALM threshold potentiometer, center of the group of three at the rear of circuit board.

3. Turn DWN ALM threshold potentiometer to the point where alarm just operates. Clockwise rotation will raise alarm setting. Verify setting by turning OXY CAL control to bring meter needle into and out of alarm zone.

4. High oxygen alarm is set by repeating steps 1 through 3 above, but adjust the UP ALM potentiometer located at the rear corner of the O_2 board. A setting of 25% is suggested.

5. To complete the oxygen circuit settings, turn the OXY CAL control as necessary to bring meter needle to the 21% position on the scale.

V. MAINTENANCE

A. Batteries

1. Check battery voltage periodically by pressing BATTERY CHECK switch. This check must be done while range switch is in CO_2 OUT position. Recharge before voltage reaches minimum.

   When connecting charger, always follow these steps:

   a. Confirm that the plug is inserted in the correct way, with the THIS SIDE UP label upwards. The socket is polarized, with the pins offset below the centerline, but can sometimes be forced on the wrong way, particularly if it has become worn with use.

   b. Verify that a charge is actually entering battery, by confirming that amber light is on. Leave connected until green light comes on, indicating that 16 hour charge is completed.

2. If sufficient voltage cannot be obtained after charging, open instrument and:

   a. Check battery voltage output with a voltmeter, between red and black wires (unplug connector to gain access to pins). Voltage should be about 8.5 volts.

   b. If no output voltage can be obtained, check battery fuse by unscrewing recessed cap, marked "FUSE", and removing fuse. It can be checked visually or with an ohmmeter. If burned out, replace with a new one, but be sure to attempt to identify the cause of the overload or short circuit. Fuse must be type 3AG-1A.

   c. If battery voltage is too low, and cannot be brought up by overnight charging, it probably needs replacement. To remove, take out the two screws holding it to bottom of case, and unplug black and orange wire connector at charging end.

3. If the replaceable cell battery pack has been installed and is found defective, open the pack and check the voltage of each individual cell with a voltmeter. To open remove two screws on the top of the pack with a 1/8" Allen wrench. The lid is spring loaded and may be held down by hand to ease the screw removal. Carefully remove the lid and the individual cells.

   a. The cells supplied are the Stock No. 49-1501 rechargeable D-size nickel-cadmium type, 3.5-4.0 AH, and when charged, measure about 1.35 volts. Discard and replace faulty cells.

b. Examine the battery cavity and carefully clean out all foreign substances. Reinsert the cells into the pack in accordance with the diagram on the lid. (Negative end to springs, button end to rivets.) Leave the proper space open for the fuse cartridge.

c. Place the lid onto the cells, press down firmly and insert screws. The convoluted case will assure cell alignment. Tighten the screws snugly, do not overtorque. It may be necessary to spring sides of instrument case apart slightly to clear battery lid.

d. Join all loose connectors, reassemble instrument and charge battery as required.

e. If normal operation from disposable batteries is desired, use the Stock No. 45-8052 battery pack instead of the 49-8051 pack. The spring-loaded top is held down by two knurled thumb screws. When replacing, tighten both screws at the same time to assure even compression of the springs and proper battery contact. Duracell* type disposable batteries are recommended for a proper fit.

This battery pack has no charger connection, so there is no danger of inadvertent charging of disposable cells. It can be used with rechargeable cells, but they must be charged separately.

B. CO_2 Coarse Zero

If CO_2 circuit cannot be set to zero within the span of the external ZERO control, then use the Coarse Zero control, marked ZERO, near edge of circuit board.

1. Set external ZERO shaft to the middle of its travel

2. Adjust Coarse Zero control to bring meter to zero while testing a CO_2-free atmosphere. Clockwise rotation moves meter upscale.

C. Filters

1. The disposable plastic filter within housing is intended to remove dust particles and liquid droplets which might otherwise reach the sensors. Inspect it periodically, and replace it when the element becomes visibly dirty.

2. The probe handle contains a replaceable cotton-ball filter element and should be inspected frequently. Remove old cotton-ball by unscrewing end from housing and loosely inserting fresh cotton-balls as needed; do not pack tightly.

* Durcell is a trade name for Duracell, Inc., Bethel, CT 06801

D. Meter

If meter is damaged, it can be removed for repairs or replacement, as follows:

1. With upper half of instrument removed from lower half and inverted, loosen internal lock nuts from POWER and VOLT CK switch bushings.
2. Remove Zero Adj. potentiometer lock nut.
3. Remove face nuts from switch bushings and potentiometer
4. Remove three screws holding circuit board into case.
5. Remove two nuts from meter studs.
6. Pull circuit board out of case as far as connecting wires permit. *Zero adj. potentiometer will come free from its mounting hole, held to the circuit board by its wires.
7. Lift out meter.

E. If buzzer fails, it can be removed by first taking out circuit board (Steps D.1-D.6) and unsoldering red and black wires at alarm switch. Then remove retaining screws and nuts.

Note: Before replacement, first verify that buzzer is actually defective. Connect to a 6 volt battery (Red +, Black -). A good buzzer will give a steady tone.

F. Circuit Board

Main circuit board can be removed entirely from instrument by steps D.1-D.6, plus disconnection of pump and battery wires at connectors, and disconnection of wires from oxygen board at connectors.

Oxygen board can then be removed following removal of retaining nuts from remaining two switches and OXY CAL potentiometer, along with buzzer and the two threaded hex standoffs. *OXY CAL potentiomenter will come free from its mounting hole, held to the board by its wires.

G. Infrared Cell

To remove infrared cell, first complete steps D.1-D.7, then:

1. Disconnect inlet and outlet tubes from nipples.
2. Unsolder the three pins extending from cell header board at main circuit board.
3. Unsolder red and black wires, at circuit board. Cell can then be removed.
4. Cell is not field-repairable. Return to factory or order a new one.

*When replacing boards, each potentiometer must be installed before its respective board. Install potentiometers square with the instrument, with the wires extending toward the front. Be sure ground lug is in place on OXY CAL potentiometer.

H. Oxygen Cell

1. Oxygen Sensor assembly may require replacement if:

   a. Meter cannot be set to desired level on air within range of OXY CAL Adjust.

   b. Meter cannot be set to zero on inert gas within range of ZERO potentiometer.

2. To replace oxygen sensor:

   a. Open instrument case. Locate oxygen cell.

   b. Swing retainer clamp clockwise and remove it to release cell.

   c. Tilt cell upward and pull it out of case. Unplug cell wire at socket.

   d. Install new cell in same position. Verify that cell is seated against its O-ring seal when installed.

   e. Oxygen cell is an electrochemical device similar to a battery which gradually depletes itself, regardless of usage of the cell.

      New cells are guaranteed usable for one year, and any cells believed to have failed within that time period, if returned under warranty, will be inspected and tested for operability. If found to have failed prematurely, they will be replaced at no charge. Cells are internally date-coded. Tampering with the code will void the warranty.

I. Pump

Pump used is a diaphragm type, driven by a DC motor. It should have long life, several years in normal operation, but it may lose efficiency if dirt is drawn in and collects under the valves. Verify proper pump operation periodically by taking a sample and observing time for gas response to occur. This should be within 5 seconds for a 3' hose.

If pump needs servicing, it can be removed by taking out the clamp retaining screw in bottom. Pump can be returned for repair on an exchange basis or it can be disassembled and cleaned. Replacement pump head assemblies are also available, as well as replacement valve sets and replacement diaphragms.

VI. PARTS LIS

Stock No.	Description
07-6216	O-ring, oxygen cell
14-3502	Retainer strap, oxygen cell
30-0017	Pump, rotary DC
30-0340	Pump head, replacement
30-0341	Pump diaphragm, replacement
30-0342	Pump valves, replacement, set of 2
33-0141	Filter, internal, Balston DFU-BQ
33-1031	Filter elements, probe
43-4140	Fuse, battery, 3AG 1A
45-8051	Battery pack, replaceable, rechargeable cell, less batteries
45-8052	Battery Pack, replaceable, disposable cell less batteries
49-1201	Battery, alkaline size D disposable
49-1501	Battery, Ni-Cad, rechargeable
49-1571	Battery Pack, Ni-Cad batteries
49-2133	Battery Charger, dual rate, time-controlled, 115 volts, for Ni-Cad batteries
49-2134	Battery Charger, dual rate, time-controlled, 230 volts, for Ni-Cad batteries
49-8051	Battery Pack, replaceable, rechargeable cell, with batteries
50-12XX	Meter, Dual range, CO_2 and oxygen, specify Job 4539
52-1005	Buzzer
57-8055M	Circuit board, oxygen, specify Job 4539
65-0601	Oxygen cell, new
65-7001	Infrared cell, replacement
80-0006	Hose, Polyethylene-lined, 6'
80-0157	Probe assembly,

When ordering part, please specify Model 3252OX and Serial Number of instrument.

SERVICE POLICY

GasTech Inc. maintains an instrument service facility at the factory. Some GasTech distributors also have repair facilities; however, **GasTech assumes no liability for service performed by other than GasTech personnel.** Should your instrument require non-warranty repair, you may contact the distributor from which it was purchased, or you may contact GasTech directly.

If GasTech is to do the repair work for you, you may send the instrument, prepaid, to GasTech Inc., 8445 Central Avenue, Newark, CA 94560, Attn: Service Department. Always include your address, purchase order number, shipping and billing information and a description of the defect as you perceive it. If you wish to set a limit to the authorized repair cost, state a "not to exceed" figure. If you must have a price quotation before you can authorize the repair cost, so state, but understand that this involves extra cost and extra handling delay. GasTech's policy is to perform all needed repairs to restore the instrument to full operating condition, including reactivation of all out-of-warranty electrochemical cells.

To expedite the repairs operation, it is preferable to call in advance to GasTech Instrument Service, (510)794-7015, obtain a Return Authorization Number (RA#), describe the nature of the problem and provide a purchase order number.

If this is the first time you are dealing directly with the factory, you will be asked to provide credit references or prepay, or authorize COD shipment.

Pack the instrument and all its accessories (preferably in its original packing). Enclose your Purchase Order, shipping and billing information, RA#, and any special instructions.

Rev. 9/91

GasTech Inc.

Standard Warranty

Gas Detection Instruments

We warrant gas alarm equipment manufactured and sold by us to be free from defects in materials, workmanship and performance for a period of one year from date of shipment from GasTech Inc. Any parts found defective within that period will be repaired or replaced, at our option, free of charge, f.o.b. factory. This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, repaired or replaced on a routine basis. Such items may include:

a) Lamp bulbs and fuses

b) Pump diaphragms and valves

c) Absorbent cartridges

d) Filter elements

e) Batteries

f) Most catalytic and electrochemical sensors are covered by a separate warranty of 12 or 24 months.

Warranty is voided by abuse including rough handling, mechanical damage, and alteration or repair procedures not in accordance with instruction manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement costs, local repair costs, transportation costs, or contingent expenses incurred without our prior approval.

GasTech Inc.'s obligation under this warranty shall be limited to repairing or replacing, and returning any product which GasTech Inc. Material Review Board examination shall disclose to its satisfaction to have been defective. To receive warranty consideration, all products must be returned to GasTech Inc. at its manufacturing facilities with transportation charges prepaid.

This warranty is expressly in lieu of any and all other warranties and representations, expressed or implied, and all other obligations or liabilities on the part of GasTech Inc. including but not limited to, the warranty of fitness for a particular purpose. In no event shall GasTech Inc. be liable for direct, incidental or consequential loss or damage of any kind connected with the use of its products or failure of its product to function or operate properly.

This warranty covers instruments and parts sold (to users) only by authorized distributors, dealers and representatives as appointed by Gas Tech.

Sls/Eng Rev. 1/90